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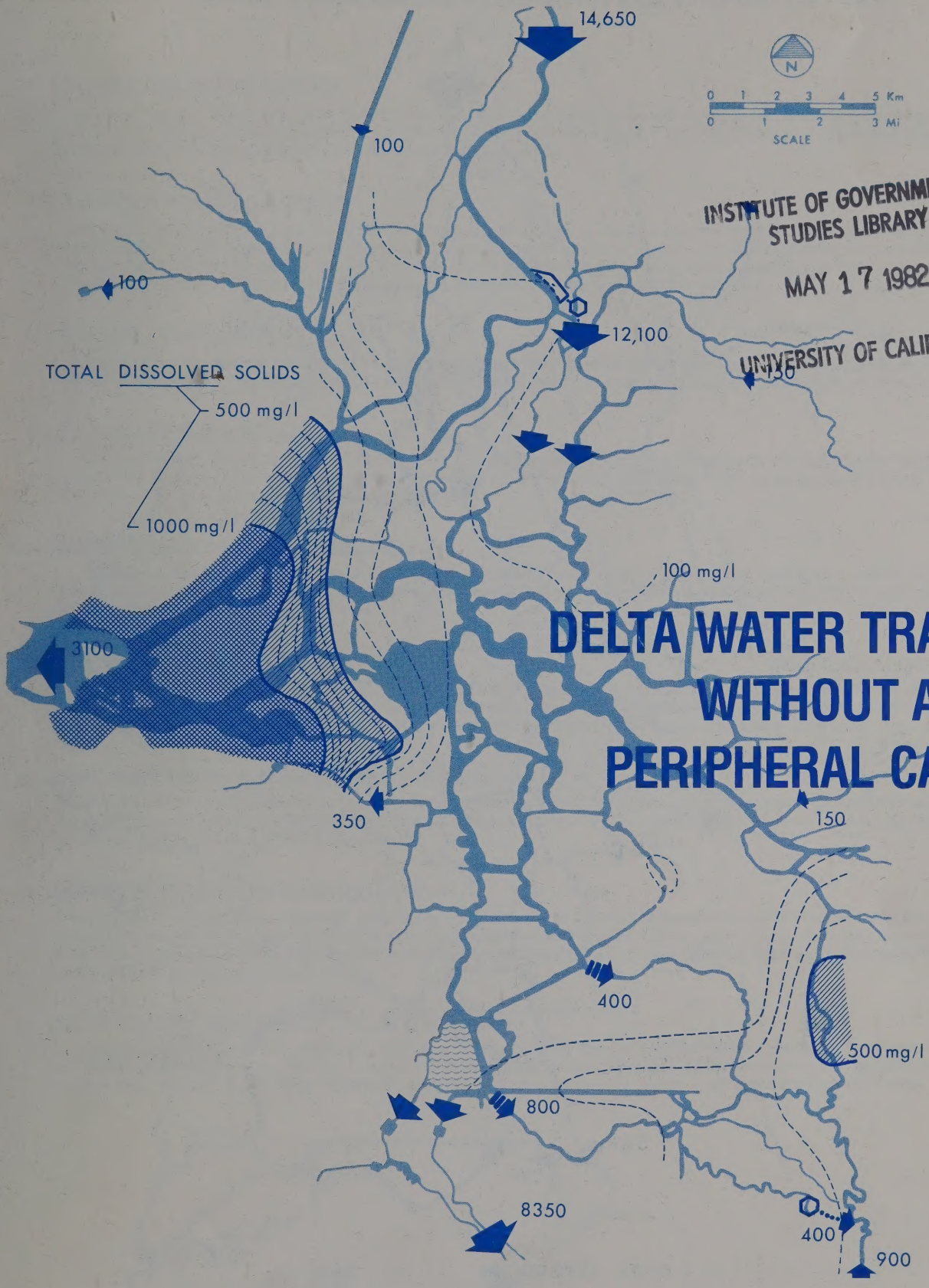

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DELTA WATER TRANSFER WITHOUT A PERIPHERAL CANAL

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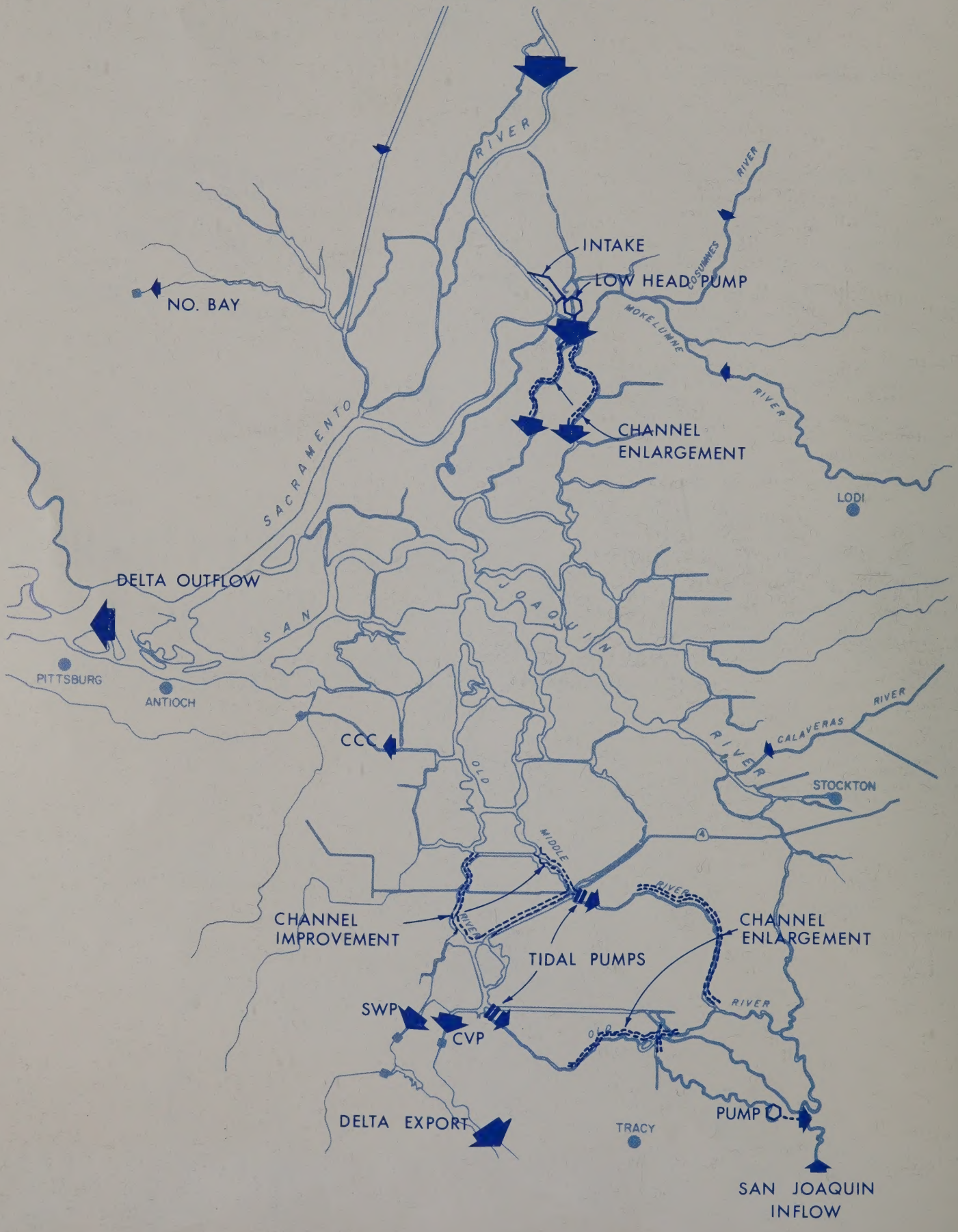
ALTERNATIVE WATER TRANSFER PLAN



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ATTRIBUTES OF THE PLAN

• AUGMENTED WATER SUPPLY

A water transfer facility, that is not isolated from the Delta, would augment water supply by withdrawing water from the Sacramento River near Walnut Grove and delivering it into the interior of the Delta through improved channels of the Mokelumne River System. Diversions could be scheduled to protect fish migration and spawning.

• LOW-HEAD PUMPING FACILITY

The existing Delta Cross Channel at Walnut Grove has a capacity to supply between 5000 and 6000 cubic feet per second under present conditions. This capacity would be augmented during periods of greater demand — for example, during summer months of dry years — by a low-head pumping facility. Discharge capacity would be increased in stages to 12,000 cubic feet per second, or greater if future water requirements increase. Facilities would be provided to assure unimpeded upstream fish migration.

• CHANNEL IMPROVEMENT

The Mokelumne channels and Georgiana Slough would be enlarged and improved to enhance carrying capacity and to balance water transfer between the Sacramento and Mokelumne Rivers. Greater flood protection would be provided for lands adjacent to these channels.

• CONTROLLED DELTA OUTFLOW

Diversion of a portion of the Sacramento inflow through the Mokelumne system and thence into the San Joaquin assures a balance of outflow in the western Delta, preventing reverse flows around Sherman Island and intrusion of salt water into the Delta. The efficiency of water allocation to the Delta is thereby greatly increased.

• WATER QUALITY ENHANCEMENT

Flexibility is provided through cross-Delta diversions to enhance water quality in channels of the western, central and southern Delta, while delivering water to the state and federal project pumps near Tracy at levels of quality that are excellent for all contemplated uses in the San Joaquin Valley and Southern California.

• CONTRA COSTA CANAL

Since the water needs of the Delta plus the export requirements of water projects are both met by flow through Delta channels, the quality of water in the central and western portions of the Delta would be enhanced. Water quality at the intake to the Contra Costa Canal could be maintained at levels desired for all uses of this water, making costly relocation of the intake unnecessary.

• SOUTHERN DELTA CHANNEL IMPROVEMENT

Channels in the vicinity of water project diversion locations would be improved to enhance hydraulic capacity, minimize levee erosion and assure efficient water supply to the export pumps. Intake structures may be modified and screened to limit entrainment of fish, as the technology for fisheries management is developed.

• IMPROVED SOUTH DELTA CIRCULATION

Circulation in South Delta channels, notoriously poor because of diminished natural inflow from the San Joaquin River, would be enhanced by channel enlargement and tidal pumping installations on Middle and Old Rivers. Some channels in the extreme southern portion of the Delta would be served by supplemental pumping. Controlled releases from New Melones Reservoir are expected to alleviate water quality problems in the San Joaquin River.

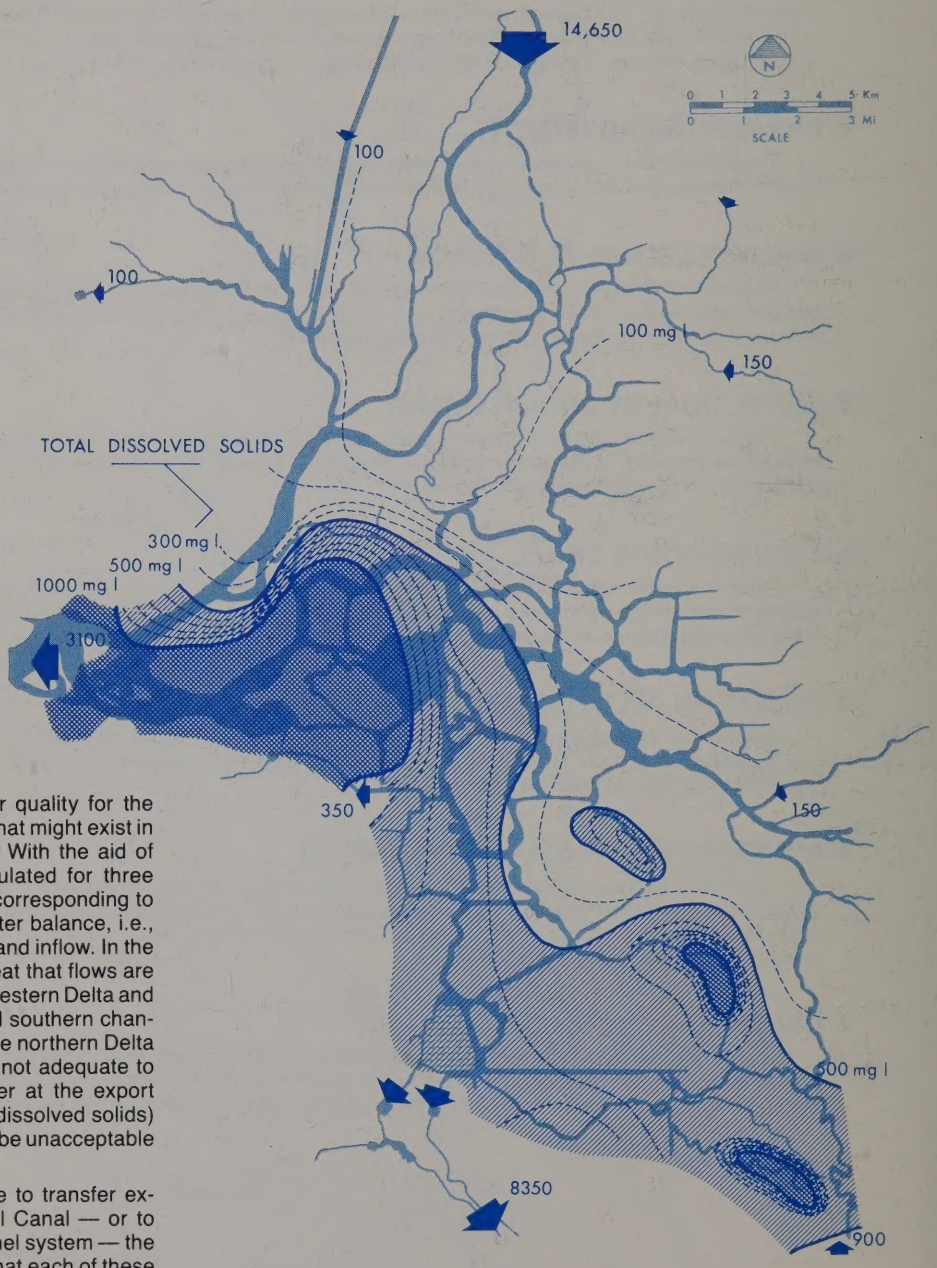
• DELTA EXPORT AND YIELD

Adequate quantities of water would be supplied at all project export locations in accordance with established contract commitments, both as to quantity and quality. The "yield" of the Alternative Water Transfer Plan, i.e., that water which will be saved by implementing the Plan compared to the present mode of transfer, will be as high — perhaps even higher — as with the Peripheral Canal.

THE DELTA DILEMMA

PRESENT CONDITIONS VS FUTURE EXPORT

Under present conditions of export pumping, the hydraulic capacities of Delta channels are sufficient to convey water from the Sacramento River in the north through the Delta Cross Channel, Georgiana Slough, and the north fork of the Mokelumne River into the interior of the Delta. It is then drawn through the channels of Old and Middle Rivers toward the project pumps near Tracy in the southwestern Delta. However, as demands for water in the south increase — as they surely will in the future — increased pumping will force the additional water to move down the Sacramento, around the end of Sherman Island, and upstream in the San Joaquin, drawing with it the saltier waters of the western Delta. This problem could be alleviated by releasing more water from Northern California reservoirs, but this water would not be available for other project purposes.



A COMPARATIVE STUDY: WATER QUALITY IN THE FUTURE

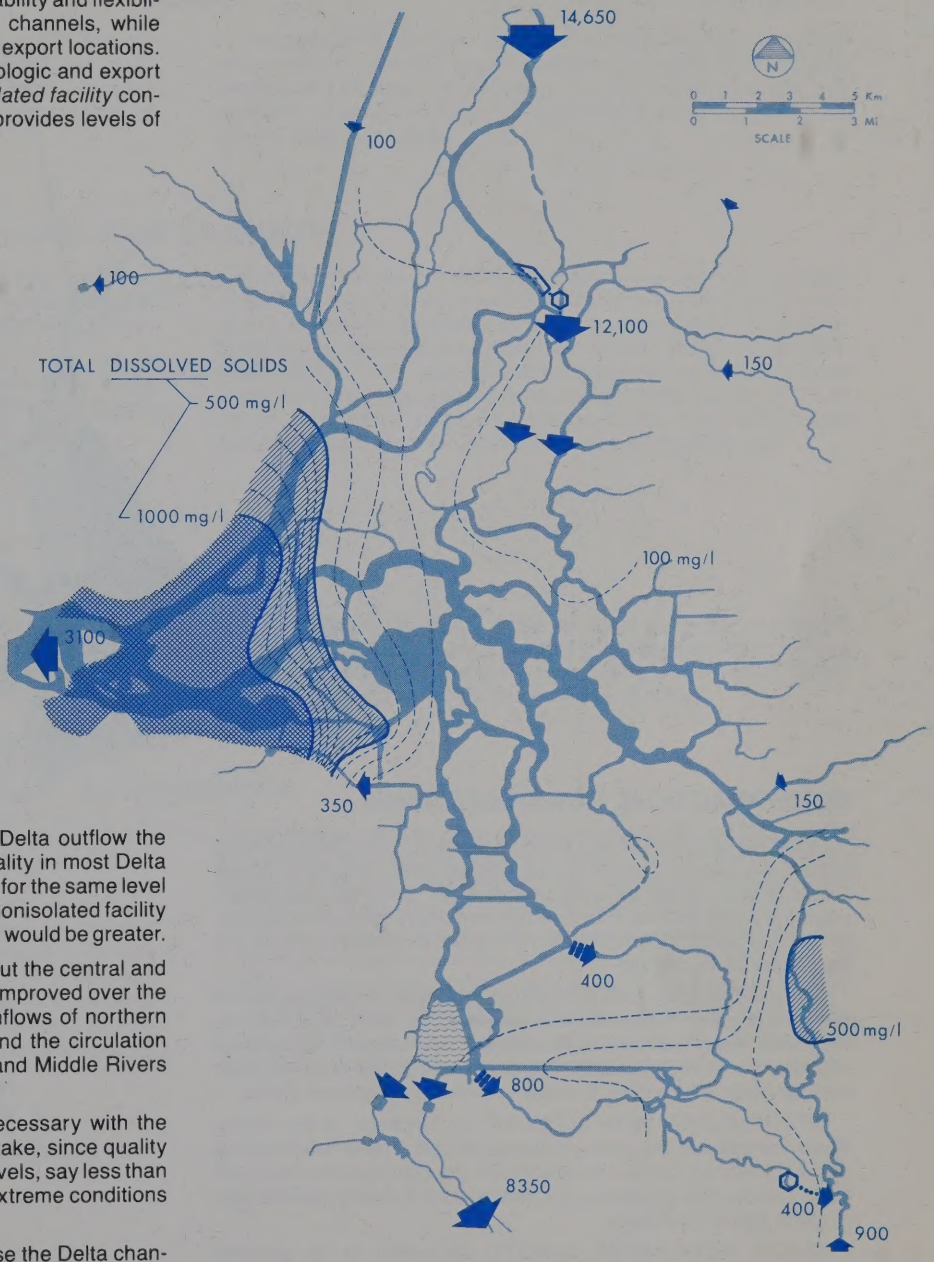
The problems of water conservation and water quality for the Delta are illustrated by considering the conditions that might exist in the month of August in a dry year like 1933-34. With the aid of mathematical models, these conditions are simulated for three cases of interest at a level of water development corresponding to the year 1990*. Each case assumes the same water balance, i.e., the same export, Delta outflow, internal water use and inflow. In the first example, to the right, export pumping is so great that flows are reversed around the end of Sherman Island in the western Delta and saline water is drawn into the western, central and southern channels. The capacity of the Delta Cross Channel in the northern Delta — only 5000 to 6000 cubic feet per second — is not adequate to prevent this reversal of flow. The quality of water at the export pumps under these conditions (measured in total dissolved solids) and throughout a large part of the Delta itself would be unacceptable for domestic and agricultural use.

Possible solutions for this "Delta Dilemma" are to transfer exported waters *around the Delta* — the Peripheral Canal — or to improve the hydraulic efficiency of the Delta Channel system — the Alternative Water Transfer Plan. Let us examine what each of these will accomplish in improved water quality, water conservation, and all of the other criteria for comparison — including *cost.*

*Model simulations were performed by G. T. Orlob and Associates, Benicia, CA.

AN ATTRACTIVE ALTERNATIVE
A NON-ISOLATED FACILITY

The Alternative Water Transfer Plan has the capability and flexibility to control water quality throughout the Delta channels, while assuring delivery of high quality water to all major export locations. As seen in the example below, for the same hydrologic and export conditions as in the previous example, this *nonisolated facility* controls salinity intrusion into the western Delta and provides levels of quality acceptable for all water users.



SOME ATTRACTIVE FEATURES:

WATER CONSERVATION: For the same net Delta outflow the Alternative produces a superior level of water quality in most Delta channels. Stated another way, it could be said that for the same level of quality produced with the Peripheral Canal the nonisolated facility would require less water, i.e., its theoretical "yield" would be greater.

WATER QUALITY ENHANCEMENT: Throughout the central and southern Delta channels, water quality would be improved over the case of the Peripheral Canal due to the larger inflows of northern Delta water through the Mokelumne channels and the circulation induced by the special facilities installed in Old and Middle Rivers and at the end of Tom Paine Slough.

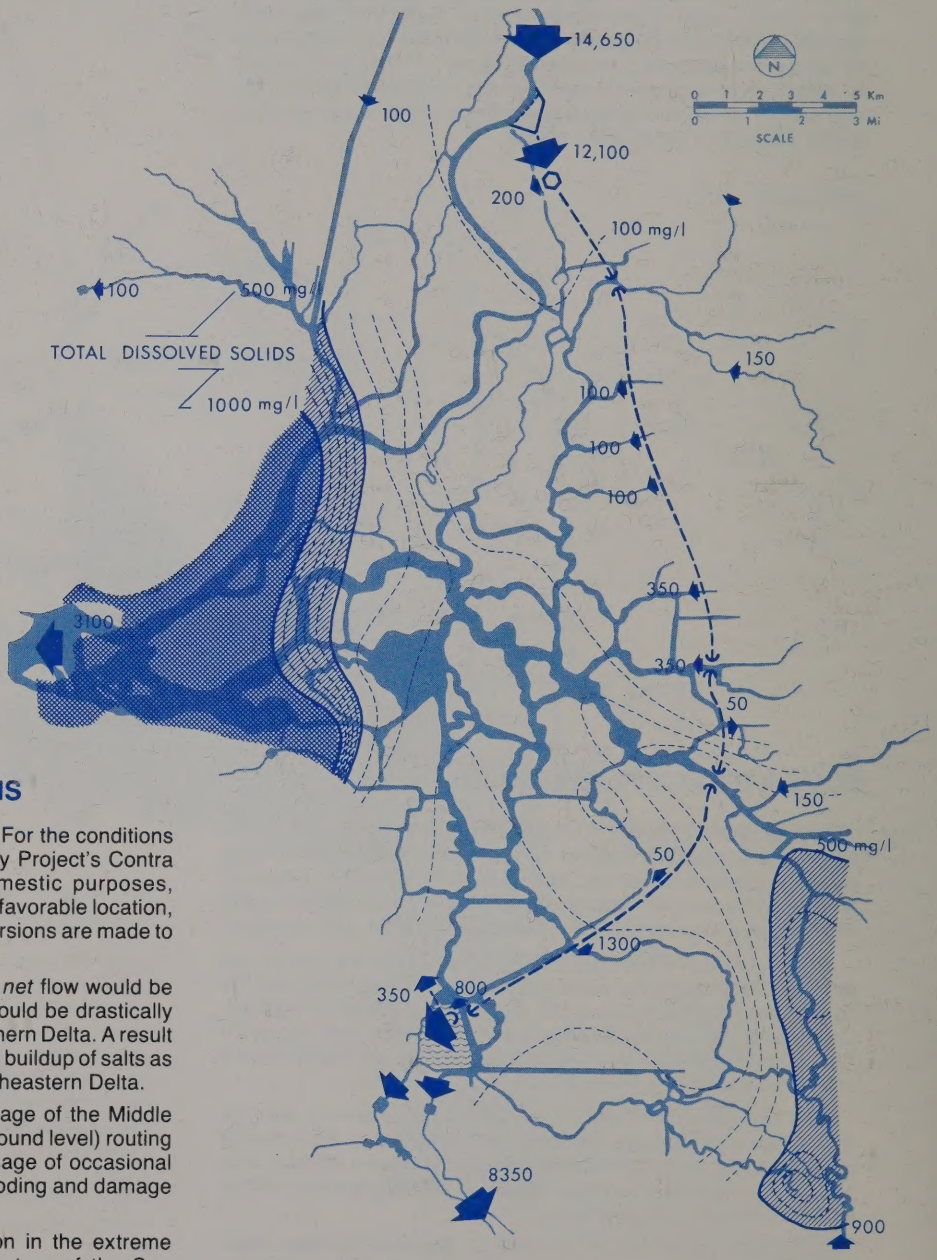
CONTRA COSTA INTAKE: It would not be necessary with the Alternative to relocate the Contra Costa Canal intake, since quality in this region could be maintained at acceptable levels, say less than 150 parts per million chlorides even under such extreme conditions as represented in this example.

CIRCULATION IN DELTA CHANNELS: Because the Delta channels are used as elements of the conveyance facility, circulations would be enhanced, flows would be predominantly unidirectional and stagnation would be virtually eliminated.

EXPORT QUALITY: Water quality at the export pumps would be at levels acceptable for all uses. In this example — for an extremely dry year — total dissolved solids would be less than 200 parts per million, about one-quarter the concentration in Colorado River water currently delivered to Southern California.

WITH A PERIPHERAL CANAL — DELTA ISOLATION

If the proposed Peripheral Canal were in place and operating as intended by the State, water could be released at selected locations along its route to balance flows between the two main channels of the Delta, the Sacramento and the San Joaquin. The result would be improved water quality, except in the extreme western and southern channels. Of course, in this case, water for export could be delivered at the same quality as that entering the Delta at the diversion point on the Sacramento River near Hood. It would not pass through the natural channels of the Delta; in effect, the Delta could be "isolated" from its principal water supply. In addition, there are certain practical problems that arise from this alternative for Delta water transfer.



SOME PRACTICAL CONSIDERATIONS

CONTRA COSTA INTAKE WATER QUALITY: For the conditions shown, the quality of water at the Central Valley Project's Contra Costa intake would be unacceptable for domestic purposes, requiring costly relocation of the intake to a more favorable location, perhaps to Clifton Court Forebay from which diversions are made to the California Aqueduct.

REDUCED FLOW AND STAGNATION: While *net* flow would be seaward in most Delta channels, actual flows would be drastically reduced in many channels of the central and southern Delta. A result would be poor circulation and stagnation, with the buildup of salts as may be noted in this case for regions in the southeastern Delta.

INTERFERENCE WITH FLOODWAYS: Blockage of the Middle River channel and the elevated (above normal ground level) routing of the Peripheral Canal would obstruct the passage of occasional flood waters, thus increasing the likelihood of flooding and damage to Delta agricultural lands.

SOUTH DELTA WATER QUALITY: Circulation in the extreme southeastern Delta, particularly on the main stem of the San Joaquin River, would be greatly reduced, causing water quality deterioration. Although improved over the case with no transfer facility, this alternative still leaves the southern Delta with an unresolved water quality problem.

SOME COMPARISONS

PERIPHERAL CANAL

THE ALTERNATIVE

YIELD

The Peripheral Canal is reported to "yield" additional water for beneficial use. The term "yield" really means projected savings in releases of stored water that would be required to meet assumed water quality standards when compared to existing conditions of Delta operation.

The Alternative can save, or "yield" at least the same amount of water as the Peripheral Canal. In addition it will save water through reduced evaporation and seepage. For the comparable levels of quality throughout the Delta, the Alternative is superior, i.e., it would provide a greater "yield."

DELTA WATER QUALITY

Quality achieved will depend upon operation of the Peripheral Canal to meet existing standards. Degradation in current standards will result if the Contra Costa County Water District intake is relocated from Rock Slough to Clifton Court Forebay.

Sacramento River Flow can be bypassed around the Delta directly to export pumps. In drier years ocean salinity could intrude into the Delta.

Quality of water in the southeastern Delta would not be improved by the Peripheral Canal.

With the Alternative, the Delta will become a common pool from which both export projects and Delta users will draw. Interior water quality will be the same as that being exported. About 90% of the Delta will be automatically protected. Interior Delta water quality requirements can be easily met without the need for release of water in excess of that necessary to meet western Delta standards. There will be no need to relocate the Contra Costa Canal Intake since suitable water quality will continue to exist at Rock Slough.

EXPORT WATER QUALITY

With the Peripheral Canal, Sacramento River water quality will be available at the export pumps except in winter months when some intermixing with other waters will occur. Export water quality requirements can be met at all times.

With the Alternative Plan, water quality at the export pumps will be the result of a mixture of water from the Sacramento River, Mokelumne River, Calaveras River and San Joaquin River. Export water quality requirements can be met at all times.

AUTHORIZATION

It has not yet been determined whether the Peripheral Canal can be constructed under the authority of the Burns Porter Act since the original plan was to utilize the existing Delta channels as conveyance facilities, thus creating a common source of water for both the Delta and the export pumps. The so-called "Waterway Transfer Plan" utilized the existing channels, but relied on physical barriers in various western Delta channels rather than pumps to induce flow across the Delta. The Peripheral Canal, which was the result of studies and evaluation in 1964, does not utilize existing channels and depends upon SB 200 for its authorization. This issue will be before the voters in the June 1982 election.

The Alternative Plan could be constructed under existing legislation in that it fits within the legislative description and also provides a common pool much the same as the "Waterway Transfer Plan." Section 12934 (d) (3) of the California Water Code provides:

> "Master Levees, control structures, channel improvements, and appurtenant facilities in the Sacramento-San Joaquin Delta for water conservation, water supply in the Delta, transfer of water across the Delta, flood and salinity control, and related functions."

No additional legislation is required; the Alternative Water Transfer Plan can be implemented in the form proposed.

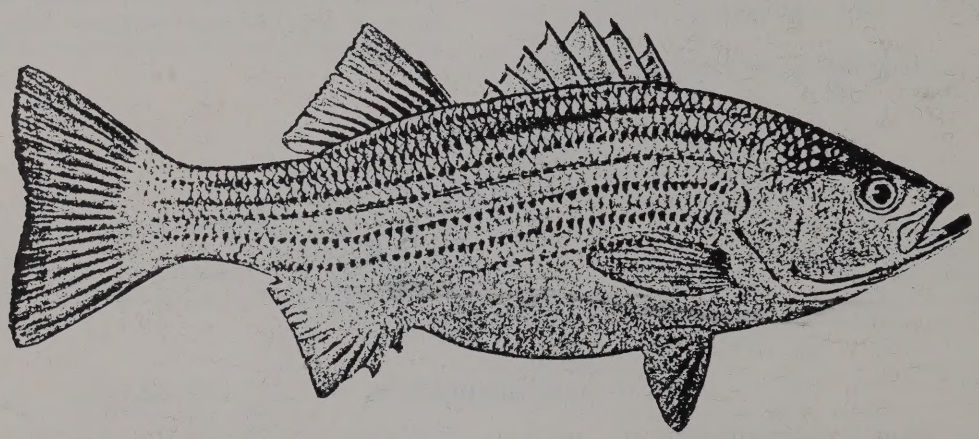
PERIPHERAL CANAL

THE ALTERNATIVE

FISH

With the Peripheral Canal all water for export and for interior Delta water quality maintenance must be pumped from the Sacramento River where 98% of salmon and 60% of striped bass will be affected. There will be no pumping from the interior or southern Delta. The Peripheral Canal will eliminate pumping influence on 10% to 20% of striped bass but its effectiveness will be heavily dependent upon the success of screening at the Sacramento River pumps. There will be almost no escape opportunity for pumped eggs, larvae, and fish. If screening is successful fish planting programs will be required to maintain the fishery in the California Aqueduct, San Luis Reservoir and other parts of the State Water Project south of the Delta. The combination of reduced flow in the Sacramento River below the intake to the Peripheral Canal together with the concentration of screened fish, eggs, and larvae at that location will result in large losses due to predation by adult fishes. Upstream migrating fish will be deadended at outlets. Delta water temperatures will be increased. Circulation in interior channels will be low. Stagnation could occur in parts of the San Joaquin River.

With the Alternative no pumping from Sacramento River will occur 75% of the time. Lower lift and reduced amount of pumping reduces dependence upon screening at Sacramento River, although these facilities can be provided if needed. Escape opportunity is provided as water moves across the Delta. Constant circulation will be maintained through the interior and southern Delta. Improvement of existing screens at Clifton Court may be desirable. Upstream migrants can be false-jumped into the Sacramento River when the pumping plant is operating (about 25% of the time). Impacts on the Sacramento River fishery will be greatly reduced and Delta water temperature increases minimized. Fish planting programs would not be needed to maintain the fishery in the California Aqueduct, San Luis Reservoir and other parts of the State Water Project south of the Delta, but could instead be provided to maintain the Delta fishery. Circulation will be strong in most channels and stagnation will be minimized.



RIGHTS OF WAY

The Peripheral Canal will require 6570 acres of right-of-way running along the eastern rim of the Delta. Most of the land to be taken is prime agricultural land subjected to intense cultivation.

Depending upon the specific design and location of the pumping plant on the Sacramento River the right-of-way required for the Alternative would range from 400 to 1000 acres thereby eliminating the destruction of over 5000 acres of prime agricultural land.

SEEPAGE

The Peripheral Canal will be an unlined earthen canal along the eastern rim of the Delta intersecting numerous sand strata and old stream beds. The water level in the Canal will be 10 or more feet above the surrounding farmland and all water for export must be pumped through the Canal. It is estimated that from 5000 to as much as 20,000 acres of productive agricultural land could be destroyed by seepage from the Peripheral Canal.

Except in the immediate area of the intake along the Sacramento River the Alternative will utilize the existing channels of the Delta. The increase in water elevation at the pumping plant will range from 1 to 2 feet while the pumping plant is operating (only during dry periods, about 25% of the time). It is estimated that the seepage damage caused by the Alternative will be less than 5 percent of that resulting from the Peripheral Canal.

PERIPHERAL CANAL

THE ALTERNATIVE

DISRUPTION OF ROADS AND UTILITIES

Located along the eastern rim of the Delta the Peripheral Canal will intersect all east-west transportation routes and utility rights-of-way from the Sacramento River to Clifton Court Forebay. This will require fourteen major bridges and numerous utility relocations including the East Bay Municipal Utility District (EBMUD) pipelines, the Southern Pacific Fuel Pipeline, the Santa Fe Rail Line and the Southern Pacific Rail Line. Future maintenance and construction of utilities will be much more expensive with the 400 feet wide, 25 feet deep Peripheral Canal as an obstacle. The cost to the local people and local government will be high.

Except in the immediate area of the Sacramento River intake where one major bridge may be required, the Alternative will utilize the existing Delta channels, thus minimizing interference with east-west transportation routes and utility rights-of-way.

INTERFERENCE WITH FLOOD FLOWS

The San Joaquin River together with Old River and Middle River must pass floodflows from the entire San Joaquin Valley. The Peripheral Canal would completely block Middle River, constrict the Mokelumne River Floodway and reroute numerous smaller flood channels. This will increase the area of flooding, the degree of flooding and the prospect of flooding upstream of the Canal. In the case of blockage of Middle River the result will be increased floodflows in the San Joaquin River at Stockton and in Old River to the south of Middle River.

The Alternative would not block or constrict existing channels and will result in increased capacity in portions of Middle and Old Rivers and portions of the Mokelumne River System. No blockage of overland floodflows would result. Since operation would be required only in dry periods increased water elevations (less than 2 feet) would occur only during such periods. At times of flooding, water levels would actually be lowered due to the increased hydraulic capacity of presently constricted channels.

CONSTRUCTION DIFFICULTY

The Peripheral Canal construction will require numerous bridges, four large siphons, and a fixed barrier at Middle River. Water in the Canal must be siphoned under the Mokelumne River, Disappointment Slough, the San Joaquin River and Old River.

Construction for the Alternative Plan may involve one bridge and two tidal barriers in the southern Delta. No siphons will be required.

TIME FOR CONSTRUCTION

It is estimated that construction of the Peripheral Canal will take place in stages over a period of at least 10 years.

It is estimated that construction of the Alternative Plan will take about 3 years. Because of its simplicity the Alternative can be easily phased to meet changing demand.

OPERATING COSTS

With a Peripheral Canal all water for export and all water for interior Delta Water quality maintenance must be pumped with a 10-foot lift from the Sacramento River. Complex siphon structures will require considerable maintenance and will be subject to possible damage during earthquakes. Canal embankments will require constant maintenance and seepage will be a major problem.

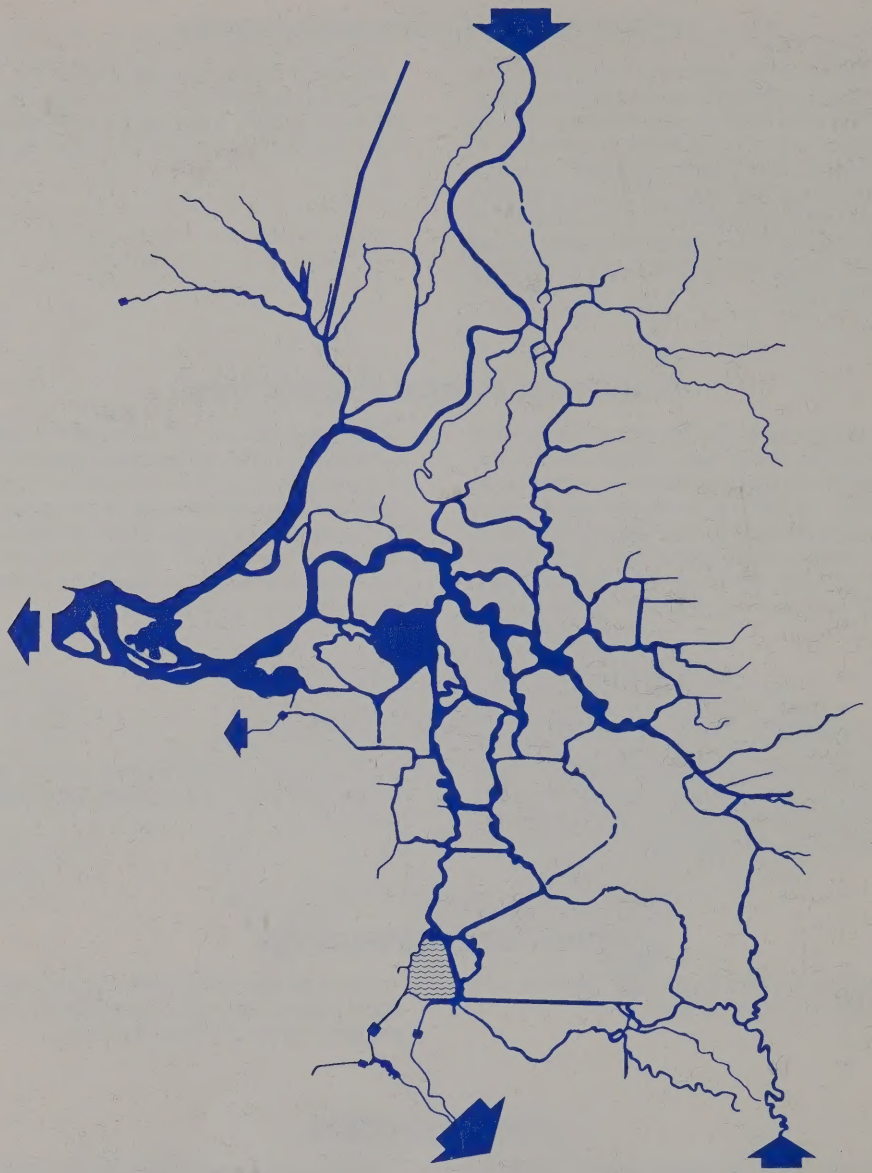
With the Alternative Plan only about 25 percent of the water to be exported will be pumped, with a lift from 1 to 2 feet from the Sacramento River. Energy requirements will be less than 5 percent of those with a Peripheral Canal. Maintenance will be minimal, less than 10 percent of that required by the Peripheral Canal.

WATER CONSERVATION

Construction of the Peripheral Canal will result in creation of a new river 42 miles long and 400 feet wide with surface evaporation of about 8000 acre feet per year. Seepage losses will be substantial.

Creation of new water surface with the Alternative will be minimal. Evaporative losses are estimated to range from 200 to 1200 acre feet per year depending upon design of the pumping plant and the extent of channel widening. Seepage losses will be negligible compared to the Peripheral Canal.

THE COMMON POOL CONCEPT



Nearly 40 percent of the runoff of fresh water from the State of California passes through the Delta on its way to the sea or to beneficial use. Considering that another 40 percent goes directly to the sea from North Coastal streams, the Delta is truly the "common pool" of water upon which the economy of California so strongly depends. It is the life blood of California's agriculture, feeding a quarter of the nation; it supports an enormous and complex ecosystem, including major commercial and recreational fisheries; it is a commercial waterway, a recreational playground, and habitat for wild fowl, and it is at the economic hub of Northern California.

Most important of all, the Delta is a focus of a *limited* resource — water — that is essential to the well being of each Californian and many others outside our state. It should not be exploited for the special advantage of one segment of our society to the exclusion of others. Any mechanism, physical or political, that would separate this resource — divert it from passage through the common pool — encourages also the division of interest in the common good.

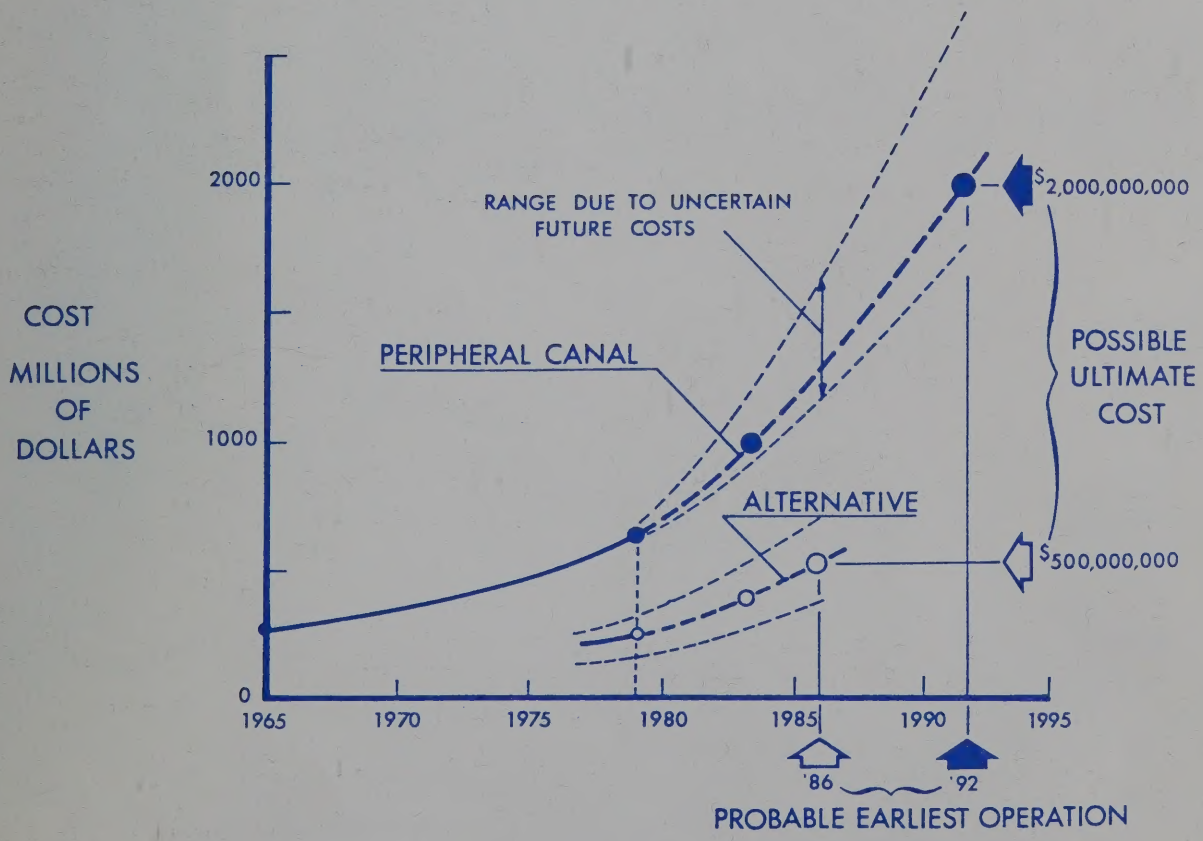
The Peripheral Canal would physicially separate the Delta from its natural supply, and in this process, jeopardize the water rights of those who historically have depended on the Delta's capability to provide an adequate supply of high quality. The Alternative Water Transfer Plan assures equity for all beneficiaries of this valuable resource. Natural and regulated inflows pass *through* the channels of the Delta, serving in-channel needs, guaranteeing preservation of environmental values, and meeting requirements for export through state and federal conveyance facilities. It is the equitable — and most certainly the least costly — way to meet the needs of all who depend upon this "common pool" of one of our most precious resources — water.

THE BOTTOM LINE; "WHAT DOES IT COST?"

Estimates of the cost of the Peripheral Canal have ranged widely since it was first proposed in the mid-1960's. The present uncertain state of our economy makes projection of costs a risky business, but it is certain that costs will continue their historic trend upwards. In 1965 the cost was estimated at $260 million; in 1979 it had risen to about $600 million and today, with construction costs and interest rates spiraling upward, it is likely to be well in excess of $1 billion. The actual ultimate cost, *if* the Peripheral Canal is authorized by the voters and considering the relatively long time required for construction (10 years or more after authorization), is very likely to exceed $2 billion.

In sharp contrast, the cost of the Alternative Water Transfer Plan is expected to be very much less, simply because there will be no 42 mile long canal, the pumping facility will be smaller, no major hydraulic structures — like the Peripheral Canal siphons — will be needed, and rights-of-way acquisition will be 10 percent or less of those required for a Peripheral Canal. In 1979 dollars it is estimated that the Alternative Water Transfer Plan could cost between $150 million and $300 million, i.e., between one-quarter and one-half the cost of the isolated facility — the Peripheral Canal. The range of cost for this plan reflects the uncertainty in the actual needs for fisheries protection in the Delta, since the technology of screening is not yet established, and this could be a large cost for either alternative of water transfer.

In today's dollars, the estimate for the Alternative would be in the range of $250 to $300 million. The ultimate cost for the Alternative will also increase somewhat due to time for design and construction. However, because it is a smaller project, is already authorized, and faces fewer uncertainties than the Peripheral Canal, it could probably be constructed within 3 to 5 years. Thus, the Alternative, in place and operating, is expected to have an ultimate cost of 15 to 30 percent of that of the Peripheral Canal.



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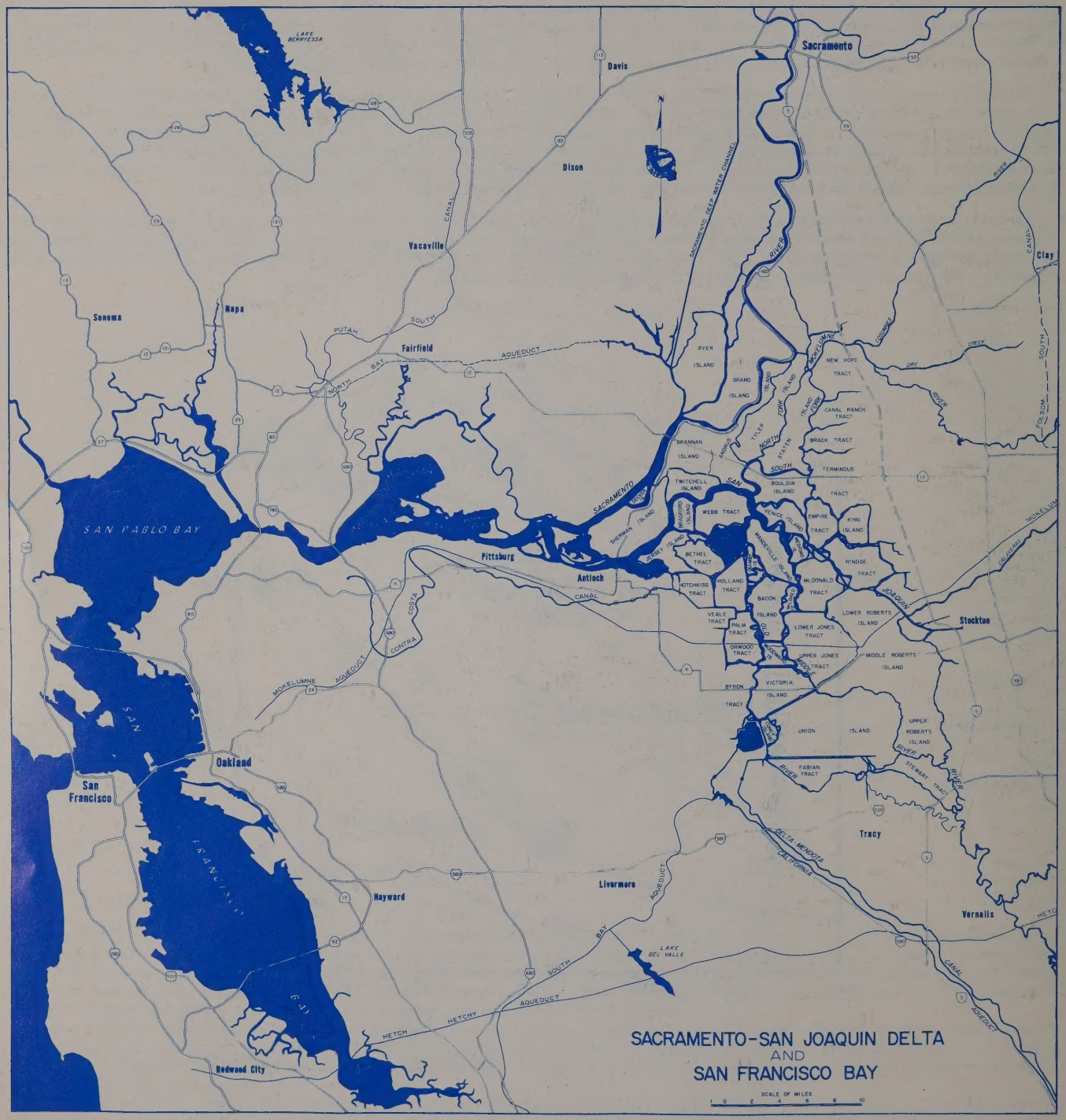

Prepared for
CENTRAL DELTA WATER AGENCY
by
G.T. ORLOB & ASSOCIATES
Benicia, California